the purpose. In the first instance, the council had proposed applying the medal to the encouragement of the younger members of the profession, and it was so advertised; but the response was not such as was desired, and therefore no award was made. Ultimately, the council determined on making it a prize for the senior members of the profession. There were difficulties in the way, but they were overcome; and he could bear testimony to the impartiality and anxiety with which the council had made the award. He did not doubt that Mr. Cockerell felt this as an important compliment, paid as it was by his professional brethren without solicitation or influence, and he congratulated himself on being present on the occasion.

Mr. Cockerell said it would be indecorous if he received this high favour silently. He deeply felt the honour which her Majesty, aided by the advice of the council, had conferred; he looked upon it as the highest honour that could be attained,—the triumph of the profession. Other academies divided their honours between the three arts, but the Institute confined hers to one, and so gave to architecture her ancient preeminence: under the Freemasons, till the beginning of the last century, she was the great centre, and was now again taking her proper place. It was impossible for him to express his feelings; he received the medal with humility, at once as the highest reward and the greatest encouragement. He congratulated the originators of the Institute and the president, to whom so much was owing, on the position to which this act of the Queen had raised the Institute.

The hearty cheers with which Mr. Cockerell was received by the large body of his professional brethren present must have been as gratifying to his feelings, as it was creditable to theirs.

A description of the cathedral church of St. Isaac, recently erected at St. Petersburgh, by the Chevalier De Montferrand, hon. member, was then read by Mr. T. L. Donaldson, and will be given by us in full as soon as the necessary illustrations can be engraved.

ON THE NATURE AND PROPERTIES OF THE METALS USED IN THE BUILDING TRADES.

ZINC.

One of the most remarkable properties of zinc is its combustibility. In covering with it roofs of houses, staircase-steps, &c., to the builder or architect unacquainted with this peculiar, and indeed, properly speaking, quite unparalleled property in a fully-metallic nature, it might be readily, and in certain cases where fire-proof construction was essentially requisite, even fatally, regarded and confided in as a preventive or check to the progress of the "devouring element;" while, on the contrary, it would be but too likely to aid and abet the conflagration with the utmost zest, being in fact so combustible that a slip of it will burn and blaze, almost as a piece of rather touchy wood will, if exposed to the flame of a mere common taper. And the combustion is even a far more splendid one, with a beautiful, brilliant, greenish white flame (in oxygen, or pure *burning* air, as vivid as that from phosphorus), yielding a smoke which, in place of being black, like that from an ordinary burning taper or stick, is of the most perfect snow-white colour, and, though not naturally volatile, floats and spreads through the air for a long time, like that celebrated classical network woven by the blacksmith of the gods, Vulcan—the Tubal Cain, doubtless, of the heathen,—a web which vied with the aerial gossamer tissue of the spider's loom. And, indeed, some of our modern chemists themselves, struck with the resemblance of the smoke of zinc to that very tissue, have compared it to the cobweb, while the ancient chemists, in a kindred spirit, called it 'nihil album,' and were therefore well acquainted with the metal, no less than with its smoke or oxide, which latter, moreover, when it did settle in flakes or flocculi from combus-

[illegible] properties of this abundant, [illegible] valuable metal, we may here [illegible] well known to that most [illegible] the Chinese, from time im[illegible] it has even been called the Chinese iron. These quaint old antediluvian petrifactions of human nature are, and probably ever have been, quite versant with the difficult and skill-requisite process of its perfect purification; and besides coins with holes in the centre for stringing them in 'long chalks,' they have been in the habit of turning zinc to account in the formation of a long line of articles, useful and ornamental. The Hindoos, too,—another curious old stereotyped race,—have a complete knowledge of the nature and properties of zinc. And these facts are the more remarkable, since the metal can only be got from the usual ore, calamine or spelter, the carbonate of zinc oxide, by a process peculiar to itself, and called distillation by descent, a process the knowledge of which the modern Europeans, and of these of course first and foremost the English, had actually to derive from the Chinese (from whom they have derived so many other useful arts and inventions), ere they could produce the metal zinc from its ore.*

When pure, zinc has considerable brilliancy, of a bluish white lustre, and though tough, may be hammered into thin leaves at the usual temperature. That commercial zinc which is brittle at a low temperature, is impure; but between 210 deg. and 300 deg. Fahrenheit, it acquires the like malleability, and may then be rolled or hammered, and laminated; and what is most remarkable of all in this is, that after such treatment, it retains its malleability even when cold. Good zinc is ductile as well as malleable, that is, it may be drawn into wire as well as hammered into sheets. It has been regarded, however, as a sort of limit or medium between the brittle metals and those that are tough and malleable, and has even been called a semi-metal. Nevertheless, even in wire its tenacity was found to be such in experiments by Muschenbroeck, that a thread or wire one-tenth of an inch in diameter would support a weight of about 26lbs., a rod of 1 inch in diameter, a weight of 2,600lbs., so that thus far at least the cohesion increased as the square of the diameter. Carefully annealed zinc not only retains its tenacity so as to be easily bent, but is also readily turned on a lathe. Laminated zinc is valuable from its comparatively slight tendency to become oxidized. We need not inform our readers how largely this useful metal, when prepared in sheets, has been employed in roofing, lining cisterns, &c., or in pipes for water, and for chimney tops, for knobs and plates for doors, and various other purposes in the building trades. Its oxide has even been used in painting as a substitute for white lead; but differences of opinion still prevail on this point. Certainly the oxide is beautifully white, but we question whether it has that *body* which the white oxide of antimony appears to have. The latter, indeed, has been regarded as an antimoniate of antimony, and therefore a fixed salt, more than a mere uncovered or single and alterable oxide such as the former is, and its powerful fixture in the fire, in circumstances where both the protoxide and the peroxide succumb, favours the idea that zinc oxide will not form so *pure white* a paint, notwithstanding its snow-white colour when pure in powder. Indeed, Mr. Parkes, the well known practical chemist and author, tells us that "this pigment is not so perfect a white as may be obtained from pure lead;" but I have found," he adds, "by experience, that it preserves a *good* colour (once qualified from its pure whiteness) much longer than white lead." The carbonate of zinc, too, or the combination of this oxide with carbonic acid gas, probably also incidentally formed in the oxide paint, has been used as a substitute for white lead, one main object in both cases, besides cheapness, being to avoid the more poisonous use of the latter. Zinc oxide, however, must not be regarded as altogether safe or innoxious. Christison, Paris, and other authorities appear to have considerable doubts even of the safety of vessels and cisterns of zinc, from the formation of oxide, although substituted for lead and copper for the very purpose of preventing injury to the stomach and bowels or the vital system at large. In the form of sulphate, so liable to be generated in water-cisterns in certain circumstances, oxide of zinc has been known to have proved fatal; but then it must have been taken in considerable quantity, and in that case, being an emetic, and used medicinally as such, it is much more likely to expel itself, and to do good in some cases rather than injury. On the whole, though very easily acted on by water, weak vegetable acids, and some saline substances, zinc is far preferable, in this respect, to copper, for pipes, vessels, &c., or to lead, for cisterns, gutters, roofing, pipes, &c.* And even its wasting properties, from the strong tendency which it has to unite with oxygen, are by no means such as might be naturally expected, for a grey scurf is formed which very much aids in the preservation of the surface and interior, unless, indeed, the mass be nailed, or otherwise in contact, with copper, or perhaps other of the more negative metals; for then, by a law of electrical induction, though the more negative metal be rendered still more negative, or accordant with oxygen as it were, and not in that antithetical or positive state with which the negative oxygen loves to unite, yet, on the other hand, the more positive metal, in this case the zinc, will be rendered still more positive, and therefore still more determinedly bent on union with oxygen—which, plentifully derived from air, or water, especially with air, rapidly corrodes or eats it away. It is this electrical activity, in fact, which renders zinc so useful in the construction of voltaic or galvanic batteries. One of its ores indeed, electric calamine, a hydrous silicate in globular and other forms, and found in Derbyshire and elsewhere, becomes electrical when merely heated.

In a notice such as this we omit many curious particulars not of immediate interest to the building trades, such as the blazing of zinc spontaneously in the metal-burning gas chlorine into "butter," the glowing luminosity of new flakes of oxide in a dark room, the phosphorescence of some of its sulphurets or ores by friction, the difficulty of uniting sulphur with the metal till, apparently, its hydrogen be be neutralized by oxygen with the metal as oxide, &c., &c.; but it would be too informal not to state that the melting point of zinc is 773° Fahrenheit; that though malleable at 250, it is actually powderable at 400, and will therefore in large or heavy masses be apt to crumble to pieces by its own weight when exposed to that heat; that at a bright red heat it boils and volatilizes like mercury, in close vessels; that the density of cast zinc is 6·862, but may be increased by forging to 7·21; that its specific heat is 0·09555 Regnault; and that its equivalent, or the quantity or proportion in which it unites with other elements, whatever their equivalent may be, is 32: for instance, the equivalent of oxygen being 8 (hydrogen being as 1), 32 parts of zinc will unite with 8 of oxygen, but never with 7, or 5, &c. It *may* unite with 16, however, or a double equivalent of oxygen, and it has even been supposed by some chemists to form more than one oxide by such union.

Considering the great importance of some of the alloys of zinc with other metals, and especially with copper in brass, and other circumstances regarding it worthy of note, these merit notice also in a collected form, rather than scattered through the separate accounts of those other metals with which this singularly useful and important metal is made to unite.

Gas in the City.—Sir: The City Commissioners of Sewers have determined to apply to Parliament for powers to purchase the gas pipes, and if necessary, to erect gas works, in order to supply the inhabitants with this necessary article at a reasonable rate. When they have purchased the pipes, they will then be in a position to say to the surrounding gas companies, "At what price will you deliver gas into these pipes?" and I believe they will *by this means* obtain the advantages without the disadvantages of competition. My object in writing to you is, to suggest the feasibility of applying the same principle to the supply of water, in which I think the monopoly is greater than even in the article of gas.

A Londoner.

* It is stated by Grignon, that something like zinc was found in the ruins of an ancient Roman city in Champagne. —*Bulletin de Fossiles, &c.*, p. 11.

* It must be noted, however, that impure zinc contains arsenic and other deleterious ingredients, while even pure zinc will give water a metallic taste.

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